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CANADIAN FIELD PEAS.

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U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY,
OFFICE OF THE CHIEF,
Washington, D. C., April 6, 1905.

SIR: I have the honor to transmit herewith the manuscript of an article on Canadian Field Peas, being a revision and extension of an article on this subject which appeared in the Yearbook of this Department for 1895, and recommend its publication as a Farmers' Bulletin.

This paper was written by Mr. Thomas Shaw, formerly Professor of Animal Husbandry in the College of Agriculture of the University of Minnesota, and was submitted by the Agrostologist with a view to publication.

Respectfully,

B. T. GALLOWAY,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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CANADIAN FIELD PEAS.

INTRODUCTION.

The term Canadian field peas, or, as it is more commonly expressed, "Canada field peas," is used with much latitude in this country. Ask a pea grower in the United States as to the variety of seed which he sowed and the almost invariable answer given is: "I sowed Canada peas." That may mean that he grew any one of nearly one hundred varieties. The answer is significant. It implies, first, a great lack of knowledge with reference to varieties on the part of those who grow peas; and, second, that much of the seed used in the United States is, or was at one time, imported from Canada, although we have large areas unrivaled in their adaptability to the growing of peas. A common type of the Canadian field pea is shown in figure 1.



FIG. 1.—The Canadian field pea.

The pea crop is one of the most important in Canada. In the Province of Ontario alone the average area devoted to the production of peas for the twenty years ended with 1902 was 710,498 acres. The

average annual yield during the period named was 13,770,243 bushels, or an average of 19.4 bushels per acre. The greater portion of this crop is fed upon Ontario farms.

In striking contrast with the magnitude of the pea crop in Canada is its insignificance in our own country. While the area devoted to peas in Ontario until quite recently was not far behind that devoted to winter wheat, the pea crop in this country is so insignificant, relatively, that it has not been given a fixed place in the Government crop reports. In Minnesota it is not mentioned in the yearbook of statistical returns, and the same seems to be true of nearly all the States in the Union. Great advances, however, have been made during recent years in growing peas in Michigan, Wisconsin, and Montana, and other mountain States.

VARIOUS USES OF THE PEA CROP.

No other grain crop, except perhaps oats, can be devoted to so great a variety of uses. The grain is possessed of a relatively high feeding value, and the same is true of the straw, as will be readily apparent by reference to the chemical analysis of each. As a pasture for certain kinds of live stock, peas may be made to serve an excellent purpose. The value of the crop for soiling and fodder uses is very great, and as a fertilizing crop peas are probably excelled only by clover.

There is no kind of live stock on the farm to which peas can not be fed with positive advantage, when they are to be had at prices not too high. They are not commonly fed to horses, since they can seldom be spared for such a use, but they make a good food for horses at work, and for colts during the period of development, if given as a part of the grain food. As a food for fattening cattle, peas are probably unexcelled. Much of the success which Canadian feeders have achieved in preparing cattle for the block has arisen from the free use of peas in the diet. During the first part of the finishing period they will be found peculiarly helpful in making beef, owing to their relative richness in protein, but they are also a satisfactory food at any stage of the fattening process. During the first half of the finishing period peas will be found superior to corn, but toward the close of the same, corn could probably be fed with greater relative advantage. Peas with oats or wheat bran make an excellent grain food for cattle that are being fattened. Speaking in a general way, peas should form about one-third, by weight, of the meal fed, but, as every feeder knows, the relative proportions of the meal used should vary somewhat as the season of fattening progresses.

As food for milch cows.—Peas furnish a good food for milch cows. They have been found peculiarly beneficial for building up dairy cows when "out of condition," and for sustaining them in fine form,

and they are also excellent for milk production. When given along with oats and bran to cows in milk, they may usually form from one-third to one-half of the grain portion by weight.

As food for swine.—Peas, when fed with judgment and care, supply an excellent food for swine at all stages of development. They are well adapted to the sustenance of brood sows during the nursing period, for the reasons that have been given for their use with cows giving milk. With shorts, ground oats, or wheat bran, they may be made to form one-third to one-half the grain portion. Peas are superior to corn as a food for pigs at any time prior to the fattening season; hence they may be fed to them more freely, but in no instance should they form the sole ration before the finishing period begins. During the fattening period peas are unexcelled when fed as the sole grain food. They promote growth, while they fatten in excellent form, and they furnish a sweet, firm, and excellent quality of pork.

As a ration for ewes and lambs.—Along with oats, in, say, equal parts by weight, peas make a good grain ration for ewes in milk, and also lambs, more especially when the latter are for the early market. They may be used in greater proportion to fatten ewes quickly after the lambs have been weaned. When sheep are being fattened for the block in winter, no grain food can be fed which will be found more suitable than peas and oats. When fed to sheep or poultry, or to brood sows in winter, peas do not require to be ground. For all other live stock it is considered advantageous to grind them, but in some instances they are soaked for feeding to swine. When so prepared they are frequently fed to growing swine when on pasture, and in order to insure due mastication they should be fed on a floor.

As food for horses, cattle, and sheep.—When pea straw is well cured, it is more relished by horses, cattle, and sheep than the straw of rye, wheat, barley, or even oats. Animals which have never eaten it may not take kindly to it at first, but soon learn to eat it with a relish. The value of the straw, however, depends largely upon the stage at which the crop is harvested, the mode of harvesting, and the perfection of the curing process. Pea straw harvested rather underripe than overripe, and then properly cured, will be eaten readily, but when allowed to get dead ripe, live stock will eat little of it unless compelled to do so by hunger. If harvested with the old-fashioned revolving horsrake, so much of the soil adheres to the straw that it is not relished by any class of live stock; and when rain falls upon the straw while it is curing, it becomes bleached and loses much in palatability. Two or three smart showers falling upon pea straw greatly injure it. When cut with the scythe or the pea harvester, cured properly, then housed or carefully stacked, the straw, except that of some of the coarsest varieties, is nearly equal to clover hay in feeding value, especially for sheep.

As pasture for sheep.—Peas are more commonly used as a pasture when sown in conjunction with some other kind of grain, and since they are more easily injured by the trampling of live stock than other grain crops, it is usual to pasture them only with sheep and swine. When sown with oats or barley, peas make a good summer pasture for sheep. The greatest objection to such pasture is in the earliness of the season at which it is produced. Of course, it may be grown later, but will not produce so abundantly. One-fourth of an acre grown at the Minnesota Agricultural Experiment Station in the spring of 1895, under the supervision of the writer, furnished pasture sufficient for one sheep for 345 $\frac{3}{4}$ days. The pasture was eaten down three times successively, with a suitable interval between the seasons of pasturing. The plat was then sown with rape, and this in turn was pastured off. The great value of peas as a pasture for swine is far too little understood.

As a soiling crop.—Peas grown in conjunction with some other kinds of grain are of great value as a soiling crop, owing, first, to the larger yields obtained (from 10 to 20 tons per acre may be expected on average soils); second, to the high nutritive value of the food, combined with its palatability; and, third, because of its timeliness. This crop is ready as soon as the spring grasses begin to fail, and it may be made to continue in season until corn is ready. It is excellent for all kinds of live stock, but especially valuable for dairy cows.

The advantages resulting from growing peas in conjunction with other grains for fodder are many. They include the following: First, larger yields may be obtained from growing these mixtures than by growing the grains used in them singly, and the increased yield extends to the grain as well as to the straw; second, when fodder is thus grown it may be fed directly to the animals—it is not necessary, usually, to chaff it with the cutting box, and the labor and cost of first thrashing and grinding the grain are avoided; third, a pasture crop, such as rape or rye, may follow the same season. Such a system will be found most helpful as an aid in destroying weeds. As the relative areas adapted to growing these foods far exceed those adapted to growing peas for the grain, it is probable that in the near future they will be most extensively grown for soiling and fodder uses.

As a nitrogen gatherer.—Like all leguminous crops, peas have the power of extracting nitrogen from the air and of depositing it in the soil for the use of other crops which follow. Hence it is that the soil on which a crop of peas has been harvested is richer in nitrogen than before the peas were sown upon it. In this we have one explanation of the practice which became general in Ontario of following peas with winter wheat. Peas could thus be made to bring more nitrogen to the soils of this country every year than is now purchased annually by the farmers at a cost of millions of dollars.

As a green manure.—Besides the nitrogen that it brings to the soil, the value of a crop of peas in fertilizing and also in improving the mechanical texture of the soil is greatly enhanced when it is grown as a green manure. When soils become so impoverished that good crops can no longer be grown on them, they may be quickly renovated and also cleaned by plowing under a pea crop preceded by winter rye. The rye should, of course, be sown in the autumn, and plowed under in the spring when the heads begin to appear. The peas should be sown immediately, and in turn plowed under when in bloom. Ground thus treated would be fertilized and cleaned in one season. Its tilth would be much improved, and its power to hold moisture would be greatly increased. To a farmer in the dry Northwest the benefit last mentioned would probably be the greatest. The high price of the seed in the past has stood seriously in the way of growing peas expressly for fertilizing uses.

WHY THE PEA CROP HAS BEEN NEGLECTED.

That so valuable a crop should not have received more attention is indeed surprising. Chief among the reasons why it has been so neglected are the following: The lack of knowledge as to its merits, the difficulty in procuring seed, the want of suitable machinery for harvesting the crop, and the small measure of attention given to it, relatively, by the experiment stations. But little is known of the value of the pea crop by the average farmer.

The scarcity and costliness of seed have hindered many from growing peas. The average prices paid to seedsmen in the United States during recent years for good, clean seed have been from \$1 to \$1.50 per bushel. The Ontario farmer usually raises his own seed or buys it for about 1 cent per pound. Suppose a farmer should buy but 1 bushel of seed and sow it with care; he may expect in the autumn 10 to 25 bushels of seed wherever the conditions are favorable to growing the crop. In some of the mountain States 40 bushels per acre are frequently harvested. Why should not farmers generally raise their own seed peas?

The lack of suitable machinery for harvesting peas has probably more than anything else hindered the extension of their growth in the United States. Where peas have to be harvested with the scythe, they are not likely to be grown to any considerable extent; but, as shown elsewhere, pea harvesters are now in use in Ontario which will cut a field of peas as quickly as a field of hay of equal area.

Very little attention relatively has been given to this crop by the experiment stations of the continent, with two or three exceptions. But little that can be regarded as of much value to the farmer is to be gleaned from station reports. The Ontario station, at Guelph, is an exception. The writer, when in charge of that station, imported

many varieties from Europe and other countries for experimental uses, and the cooperative experiments with the best of these varieties which have since that time been carried on by the farmers in various parts of Ontario have been of great value in determining the most suitable kinds for the different sections of the country. In the judgment of the writer, experiments conducted on somewhat similar lines by experiment stations located in some, if not, indeed, in all the North-western States, would render most valuable service to these States.

AREAS ADAPTED TO PEA CULTURE IN THE UNITED STATES.

Without any doubt there are vast areas in our favored country well adapted to growing peas as a grain crop. But the areas in which the crop can be grown for pasture, for soiling uses, and for fodder are vastly greater, as heretofore intimated; for where peas can be successfully grown as a grain crop they can also be grown for the other uses named. In the present state of our knowledge it would be impossible to enumerate all the areas in which peas can be successfully grown for any of the uses mentioned, and it would be even more hazardous to specify where they can not be grown. But these areas may be defined in a general way.

Peas can be grown as a grain crop with a reasonable degree of success in certain areas of New England and in much of New York and Pennsylvania. They are successfully grown in northern Michigan, northern and eastern Wisconsin, and northern Minnesota. They will also grow well in North Dakota, Montana, Idaho, Oregon, Washington, and indeed in all the mountain States in which the elevation is sufficient to insure reasonably cool summer temperatures and where a reasonable amount of moisture is present. In northern Ohio, southern Michigan, southern Wisconsin, southern Minnesota, and South Dakota they are not so sure a crop as in the areas named, but sometimes they produce well.

Southward from the States just named, peas can not always be depended on to yield well. The summer temperatures are too warm for them. Even though they should produce a good crop of straw, if a hot wave should pass over them while in bloom they would not fruit well. But in all this section of country great use can be made of peas when grown with other crops for pasture, for summer feeding, and for fodder. Still farther to the south the wisdom of giving much attention to this crop is open to question; the southern cowpea has taken its place there.

GROWING PEAS FOR DIFFERENT PURPOSES.

In discussing the growing of peas as a grain crop, problems relating to soils, rotation, tillage, seed, varieties, harvesting, storing, and thrashing require to be considered.

ADAPTABILITY IN SOILS.

Peas may be grown successfully on a variety of soils, but those designated clay loams, and which are well supplied with lime, are best adapted to their growth. However, good crops may be obtained on the stiffest clays. The potash element in these favors the growth of peas. Light, leachy sands, being deficient in moisture, do not produce enough growth of vine, and black, humous soils produce too much. Overwet soils are wholly unsuited to the growth of peas.

PLACE IN THE ROTATION.

Theoretically, peas should not come after meadow or pasture, since they are capable of gathering nitrogen from the atmosphere, and in consequence do not need the sustenance furnished in the decay of grass roots so much as other grains; but in practice they serve the end of quickly subduing such soils by promoting the rapid decay of the sod and so putting the land in excellent condition for the crop which follows. Peas may be assigned any place in the rotation, but the aim should be to have a grain crop follow which is hungry for nitrogen.

PREPARING THE LAND.

In climates where peas can be grown at their best, namely, climates with low winter temperatures, the land for peas, as for nearly all grain crops, should be plowed in the autumn; but peas will do better than the other small cereals, relatively, on spring-plowed land. A fine pulverization of the soil is advantageous, but it is not so necessary for peas as for other grain crops, since the pea is a hardy and vigorous grower.

SOWING THE SEED.

Some writers advocate sowing the seed broadcast and then plowing it under. On heavy soils this method would bury the seed too deeply. On prairie soils it promotes the rapid evaporation of soil moisture. On fall-plowed lands the better plan is to prepare the seed bed by pulverizing it, and then to sow the seed with a grain drill. When broadcasted and covered with the harrow only and rain follows, much of the seed will be exposed; but the writer has grown excellent crops on spring-plowed stiff clays from hand sowing without any previous pulverization. When such lands are carefully plowed, the peas fall in the depression between the furrow slices, and the subsequent harrowing covers them. Peas should be buried less deeply on stiff clays and more deeply on the soils of the prairie. The depth may be varied from 2 to 5 inches. The pea crop should be sown as soon as the soil can be worked freely; but it will suffer less, relatively, than the other grain crops if the sowing has to be deferred.

The quantity of seed required will vary with the character and condition of the soil and with the variety of seed sown. Rich and moist

soils do not require so much seed as where the opposite conditions prevail. The amount of the seed sown should usually increase with the size of the pea. The quantities to sow per acre will vary from 2 bushels with the smaller varieties to $3\frac{1}{2}$ bushels of the larger sorts. One great difficulty to be encountered in growing peas on prairie soils is the usual luxuriance of weed life, but this may be held in check by harrowing the crop before it appears above the surface. Harrows with teeth which may be set aslant are the most suitable for the work.

VARIETIES TO SOW.

The most suitable varieties of peas to sow will depend somewhat on soil and climatic conditions; and the best way, probably, to determine which kinds are best suited to the varied conditions of each State would be through experimentation on what may be termed the cooperative plan, as practiced in Ontario. This plan in outline is as follows: The station furnishes the seed of a number of proved varieties to farmers in different sections of the country. These varieties are to be grown under similar conditions, and the growers are also to report the results to the station at a given date. The results are then summarized and made public. The farmer as his compensation keeps the grain which he grows.

Several varieties have been thus tested in Ontario for several years past. The three which have proved most satisfactory, all things considered, are the Prussian Blue, Canadian Beauty, and Tall White Marrowfat. The respective average yields of grain and also of straw have not been far different, nor was there much difference in the average time of maturing. The Prussian Blue is one of the most hardy, prolific, and reliable sorts grown in Ontario. The peas are blue in color and they weigh well. The Canadian Beauty is a handsome pea, white in color, and somewhat large in size. The Tall White Marrowfat is of large size and it is a vigorous grower. The four best yielding varieties grown at the Ontario experiment station for several years proved to be the Early Britain, White Wonder, Mummy, and Prussian Blue. The average yields were very similar. The Early Britain, imported from England in 1889, has proved a uniformly good yielder, but the peas are a little brownish in color and somewhat irregular in shape. The White Wonder, imported from New Zealand in 1890, is a very promising variety. It is a free grower, a good yielder, and the pea itself is attractive in appearance. The Mummy, a well-established variety, is a strong grower, but the straw is coarse. The pods are prone to cluster about the top of the vines. Among the other useful varieties that have been grown at the Ontario station are the Centennial White, Cleveland Advancer, and the Golden Vine. The last named is an

old stand-by. When farmers speak of "Canada peas" they have reference probably to this variety more often than to any other. All the varieties named should do at least fairly well in the New England States, in northern Michigan and Wisconsin, and in the various western mountain States. Through the various States of the Northwest the following varieties stand high in favor with the farmer, namely, the Golden Vine, the Yellow Canada field pea, the Green Canada field pea, and, to a less extent, the Chancellor. It is not possible, however, to give the names of the most popular varieties in the Northwest with sufficient exactness, owing to the various names applied to the same variety.

HARVESTING THE CROP.

Until recent years the pea crop was harvested with the scythe or with the old-fashioned revolving hayrake. The first method is slow; the second shells out many of the peas, and it so covers the vines with soil as to render the straw practically unfit for use. Happily, a pea harvester has been introduced, by the aid of which the crop may be harvested speedily and in excellent condition on level soils. It is simply an attachment to an ordinary field mower, as shown in figure 2.

The guards in front lift up the peas so that the knife can cut them cleanly. The cut peas fall behind the mower in a string-like row, or swath, and two men with forks bunch them and lay them aside out of the way of the horses. Three men and a span of horses may thus harvest 10 acres in a day. This attachment for harvesting peas is made in Canada, and those now in use in the West have all been imported. On rear-cut mowers a platform is sometimes used, as shown in figure 3.

With this attachment, one man walks behind and with a fork throws the peas off in bunches. But the platform is of doubtful advantage unless the crop is evenly ripened, not too heavy, and free from standing weeds of strong growth. Where the land has been plowed in ridges, with furrows more or less deep between them, the working of the machine will be seriously interfered with.



FIG. 2.—Pea harvester.

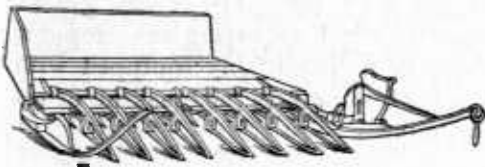


FIG. 3.—Pea harvester with platform.

STORING THE CROP.

It is usual to turn the bundles over once to facilitate drying while they lie on the ground. They require hand loading. The crop may be stored under cover or put into stacks, as with other grain, but it should be borne in mind that peas when in the stack do not readily shed rain, and therefore the stacks should be carefully topped out with some substance, such as bluegrass or native prairie hay. When the thrashed straw is preserved in stacks the same precautions are necessary.

THRASHING THE CROP.

Where only a small quantity is grown annually, and this with a view to provide seed to sow for pasturé, soiling, or fodder uses, there is no better way of thrashing the peas than by using a flail or by treading them out with horses. The seed is not then broken. Where a

large acreage is grown it is necessary to thrash peas with a thrashing machine, and the best work is done by using the "bar concave," as shown in figure 4.

From this concave all the teeth should be removed except four. These hold the straw in check long enough to enable the cylinder teeth to beat out

all the peas. The machine should not run at a high rate of speed. More or less of the seed is likely to be broken. The broken grains, however, may be nearly all removed when preparing the crop for seed or for market by using fanning mills suitably equipped with sieves. When the crop is wanted for feeding uses the breaking of the peas does not, of course, lessen its value.

HOW THE PEAS ARE GROWN.

The great value of peas for various uses has already been dwelt upon, and the method of growing and harvesting the grain crop has been discussed. It only remains, therefore, to speak of the methods by which peas are grown for ordinary grazing and soiling, for fattening sheep and lambs, and for fattening swine.

HOW GROWN FOR ORDINARY GRAZING AND SOILING.

When peas are grown in conjunction with other grain for pasture, the mixture should be sown somewhat thickly. For sheep, 1 bushel of peas may be taken as the basis of the mixture, and from 1½ to

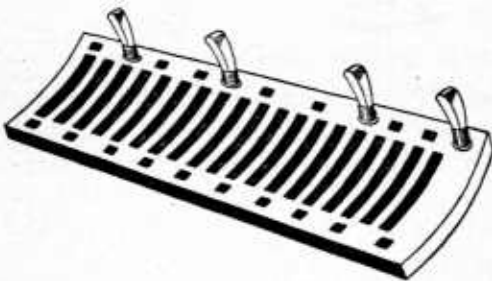


FIG. 4.—Single concave thrashing machine with four teeth.

2 bushels of other grain. When seed drills are used, the seed should be mixed before it is sown. Under other conditions it would be necessary to plow the peas in lightly, and then sow the other grain and cover it with a harrow. Peas and oats or peas and barley may be grown as a pasture for swine in the same manner as for sheep, but it is generally thought better to reduce the proportion of peas when the pasturing is to begin at an early stage in the growth of the plants, as swine break down the pea vines to a greater extent than sheep. Hitherto it has been common to sow peas alone as a pasture for swine, and to defer pasturing them until the peas in the pod are about ready for table use. About 2 bushels of seed per acre will suffice. Swine should be accustomed to such pastures by degrees, because the sudden change of diet might be injurious to them. The season of pasturing may be prolonged by sowing the peas at successive periods, with a proper interval between them.

When peas are grown as a soiling crop, the relative amounts of seed used on clay soils are much the same as when they are sown to provide pasture for sheep, and they are also sown in the same way. Oats, however, is the favorite grain to mix with the peas, and the proportions of seed used per acre on such soils are usually $1\frac{1}{2}$ bushels of the former to 1 bushel of the latter; but no definite rule can be laid down as to the relative amounts of seed that should be used when growing these mixtures for soiling or for fodder uses. The richer the land the larger the proportion of peas that should be used, lest the oats should unduly overshadow them. On some of the humous soils of western prairies it may be advisable to sow not more than 2 to 3 pecks of oats per acre. Every farmer will have to determine for himself the relative quantities of seed which will best suit his conditions.

The cutting and feeding of the crop may commence as soon as the heads of the oats begin to appear, and it may be continued until the crop is approaching maturity. When not all wanted for soiling uses, the residue may be cut and cured for winter feeding. Generally the best yields will be obtained from the seed sown earliest in the season.

For winter feeding the same methods of growing peas may be adopted as when they are grown for soiling uses, with the difference that more varieties are frequently used. The harvesting should take place when the dominant grain used in the mixture is nearly but not quite ripe. When the respective quantities of seed have been correctly adjusted, the crop can be harvested with a binder in a normal season, but in case it is thrown down by storms a mower will have to be used.

HOW GROWN FOR FATTENING SHEEP.

During recent years a large area of peas has been grown in the San Luis Valley, Colorado, on which sheep and lambs—particularly the

latter—are being fattened without harvesting the crop. In other words, the peas are harvested by the sheep. This valley has an elevation of 7,000 feet above the sea and the season for growth in it is very short. The temperature is so cool, especially after nightfall, that light frosts occur some seasons during every month of the summer. Peas were sown for a time in the valley to furnish hay, but now they are grown almost exclusively to furnish material for fattening sheep. In 1901, 15,000 sheep and lambs were thus fattened in the valley. On the crop of 1904 it is estimated that 200,000 have thus been made ready for the market. It is further estimated that this valley has a capacity for fattening 1,000,000 head annually. It is more than probable that the entire valley will be virtually devoted to the growing of peas within the next few years.

The peas are sown in the early spring on ground prepared by plowing or disking. The varieties sown are known locally as the Mexican and the Canada field pea. The former is more early in maturing than the latter. The peas are sown with an ordinary grain drill and from 40 to 50 pounds are sown per acre, along with a small quantity of wheat or oats. These are sown chiefly to furnish support to the pea crop, and the seed is mixed before sowing. Sometimes one irrigation is given, but more commonly the crop is not irrigated. The unirrigated crops receive moisture chiefly from subterranean sources, as the water table under much of the area of the valley is not far from the surface.

Sheep and lambs are brought in from the ranges and turned in to graze upon the crop as soon as it is ripe. The vine and grain are thus consumed where they grew. From seventy to ninety days will suffice to put lambs in the finest possible condition for the market. A somewhat longer period is required for ewes that are lean when first turned in to graze. Lambs will make about 8 pounds of increase per month while thus being grazed, and a good crop of peas will fatten from 10 to 15 lambs per acre. Assuming that each acre will graze 12 lambs on an average for ninety days, and that the increase made is worth $4\frac{1}{2}$ cents per pound in Colorado, the value of the mutton thus produced on 1 acre would be \$12.96. There would also be a further return from the increase in value of each pound of the weight of the lambs at the beginning of the grazing season. Though some of the peas are shelled out during the early stages of the pasturing, these are nearly all gathered later. The results are also more satisfactory when the sheep are made to graze down the crop by confining them to a portion of the area until it is consumed, rather than to allow them to roam over the entire area from the first. This can be done without difficulty by the use of movable fences.

In no other way can sheep and lambs be fitted for the market at so small an outlay, except by finishing them on Dwarf Essex rape. Finishing on rape is sometimes attended with loss from bloating, but this danger is not present when finishing on peas. The pea, being a nitrogen gatherer, leaves the ground in better condition as to fertility than rape; hence, where the conditions are suitable, it is without a rival, all things considered, in preparing sheep for the market. The favorable conditions are a suitable loam soil such as is usually found in the western valleys, an altitude sufficient to furnish a cool summer climate, ground moisture in sufficient quantity and near enough the surface to sustain the crop, or, in its absence, irrigating waters, and a dry season in which to graze down the crop. While all these conditions are important, that named last is indispensable, as to attempt to feed off a crop by sheep in rainy weather would result in an almost total waste of the crop and in disaster to the sheep.

The extent to which this system of grazing sheep may be extended in the mountain States is virtually without limit. It has been stated that the San Luis Valley has capacity to fatten 1,000,000 lambs each year. It is claimed that Colorado has several valleys each of which has nearly equal capacity and similar adaptation, to say nothing of the many smaller ones scattered through the State. This is doubtless also true of each of the States of Wyoming, Montana, Idaho, Utah, Nevada, and of California, Oregon, and Washington. The expectation, therefore, would not seem extravagant that the industry will extend to all these States in the near future and that it will eventually absorb all the surplus sheep and lambs grown on the western ranges to supply its needs. Such a result would be simply beneficent. It would revolutionize sheep husbandry in the West.

HOW GROWN FOR FATTENING SWINE.

In some of the Northwestern States, and in all the valleys of the western mountain States, it is entirely practicable to grow peas and to fatten swine upon them in the fields in which they have been grown. This method of harvesting peas with swine is practicable wherever Canada field peas are grown, but in climates of much rainfall in the autumn months the grazing would be attended with considerable loss, and on clay soils much injury would be done to the land. Moreover, it would always be accompanied by a loss of the straw for food, but where other fodder is plentiful, this loss would be more than compensated by the saving in labor effected by harvesting the crop in this way.

In western Minnesota and in much of North Dakota and South Dakota it would be entirely practicable to grow and harvest peas thus, as the autumn season in the areas named is usually dry. Peas

will also yield well in those areas when properly grown; hence, there would seem to be no good reason why in these localities peas should not be made to take the place of corn in fattening swine and with much less labor involved than is called for in growing and feeding corn. The peas are grown in the same way as when grown for the grain. The swine may be turned in to feed upon them as soon as they are of full size in the pods, and the grazing may, of course, continue until the crop is consumed. If the swine can have access to alfalfa pasture while thus gleaning, the profits will be increased, but on peas alone swine will keep healthy and gain rapidly. The fattening period will cover 60 to 90 days, according to the condition of the animals when the harvesting of the crop begins, and the increase in weight should be not less than 1 pound for each animal daily.

In all or nearly all the valleys of the mountain States it would thus be possible to produce an immense amount of pork in the aggregate and at very low cost, and this would follow whether the peas were successfully grown with or without irrigation. In all these valleys the conditions which produce good crops of peas will also produce good crops of alfalfa. Swine can be very cheaply grown on alfalfa with the addition of but little meal or grain until the season arrives for finishing them on peas. The same areas produce barley readily, on which brood sows may be wintered very cheaply when fed along with field roots and alfalfa hay. In no other way can pork be produced more cheaply at the present time in this country or of better quality. While the straw of the pea crop is lost for feeding by this system, it will render good service when plowed under in supplying the land with vegetable matter relatively rich in nitrogen.